

CMAQ Tutorials

Add a Tracer Species to CMAQ



This tutorial will step you through adding an inert tracer to the CMAQ model. Additional details are provided in the CMAQ Operational Guidance Document (OGD) that can be found online (http://www.airqualitymodeling.org/cmaqwiki/index.php?title=CMAQ_version_5.0_%28February_2010_release%29_OGD).

STEP 1: Create tracer namelist

Create namelist according to Table 8.4 in the CMAQ OGD. Include 1 line for each tracer species with the following format (Refer to the table below for more information on the abbreviations):

'SPC:MOLWT:EMIS_SUR:EMIS_FAC:ICBC_SUR:ICBC_FAC:T2AE_SUR:T2AQ_SUR:ADV:DIFF:DDEP:WDEP:CONC'

Column	Name	Type	Description
1	SPC	String	CMAQ pollutant name, i.e. NO, HNO3, PAR; dependent on chemical mechanism
2	MOLWT	Integer	Pollutant molecular weight
3	EMIS_SUR	String	Emissions species name for the CMAQ pollutant
4	EMIS_FAC	Real	Scaling factor for input emissions
7	ICBC_SUR	String	IC/BC species name for the CMAQ pollutant
8	ICBC_FAC	Real	Scaling factor for the IC/BC concentration
11	T2AE_SUR	String	Tracer-to-aerosol transformation species
12	T2AQ_SUR	String	Tracer-to-aqueous transformation species
13	ADV	Yes/No	Advection switch
14	DIFF	Yes/No	Diffusion switch
15	DDEP	Yes/No	Dry deposition output file switch
16	WDEP	Yes/No	Wet deposition output file switch
17	CONC	Yes/No	Concentration output file switch

Amended from Table 8.4 in CMAQ OGD

An Example using CO₂:

Create file Species_Table_TR_CO2.nml that contains:

```
&TR_nml

n_surr1 = 2,
n_surr2 = 2,
n_ctrl = 5,

TYPE_HEADER =
'SPC:MOLWT:EMIS_SUR:EMIS_FAC:ICBC_SUR:ICBC_FAC:T2AE_SUR:T2AQ_SUR:ADV:DIFF:DDEP:WDEP:CONC'

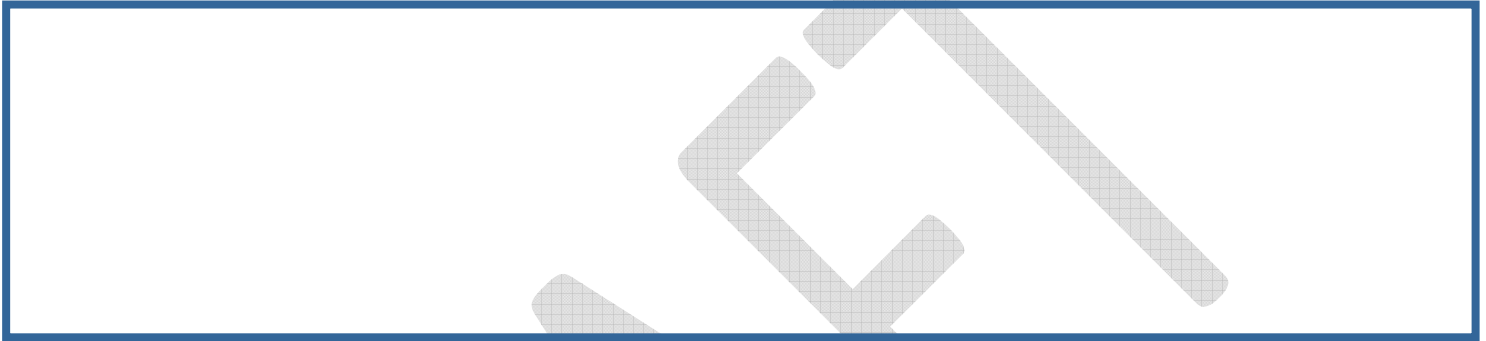
TYPE_MATRIX = 'CO2:28.0:CO2:1.0:CO2:1.0:::Yes:Yes:Yes:Yes:Yes'
```

STEP 2: Configure CMAQ to use tracer in CCTM, BCON, and ICON processes

The configuration files for each of these processes are set, by default, to not use tracers. Each configuration script (i.e., bldit.bcon, bldit.icon, bldit.cctm) have an environmental variable called “Tracer” that is set to “trac0”. This sets the “Tracer” variable to a blank tracer namelist. To include a tracer, the “Tracer” variable needs to be set the namelist created in STEP 1.

An Example using CO₂:

Create file tracCO2 that contains:



STEP 3: Include namelist in run script

In your CMAQ runscript set environment variable tr_matrix_nml to the path of the tracer namelist:

```
setenv tr_matrix_nml $Path/to/tracer/namelist
```